

Authentication of Scotch Whisky by GC Analysis Using an Agilent J&W CP-Wax 57 CB Basic Column

Application Note

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Introduction

The production of genuine Scotch whisky is strictly regulated to ensure its quality and to protect whisky as a premium product. Various analytical methods are employed to confirm the authenticity of Scotch whisky brands. GC analysis is one of the techniques frequently used in the identification of counterfeit whisky products.

The characteristics of Scotch whisky are strongly influenced by the cereals used in fermentation and by distillation, maturation and blending. This leads to characteristic analytical profiles for the alcohol congeners, which can be used as reference points in authenticity analysis. The CP-Wax 57 CB Basic column is highly suited for this alcohol congener identification separating the most critical peak pairs:

- 2-methyl-1-butanol and 3-methyl-1-butanol
- Isobutanol and isoamyl acetate
- Ethylacetate and acetal

Due to the intensive crosslinking of the CP-Wax 57 CB liquid phase, the column shows an excellent stability and robustness for injections of water/alcohol related samples such as spirits. The base treatment of the Wax 57 liquid phase ensures the interference free elution of furfural from acetic acid making this particular GC column highly suited for the analysis of whisky and related spirits.



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Conditions

Technique: GC-FID
Column: CP-Wax 57 CB Basic, 50 m x 0.25 mm x 0.20 μ m (part number CP97723B)
Sample Volume: 0.5 μ L
Carrier Gas: 3.0 mL/min H₂, constant flow
Injector: 200 °C, split 1:25
Temperature: 35 °C. 6 °C/min, 120 °C
Detector: FID, 210 °C

Discussion

The suspect whisky (Figure 1) exhibits a different alcohol profile compared to genuine blended Scotch whisky (Figure 2). Relative concentration levels for n-propanol and isobutanol are much lower compared to a Scotch whisky, this as a result of a higher distillation efficiency used in the manufacturing process of the counterfeit product. Also the 3-methyl-1-butanol / 2-methyl-1-butanol ratio is relatively high (> 5.0) indicating a spirit of non-cereal origin (Figure 3).

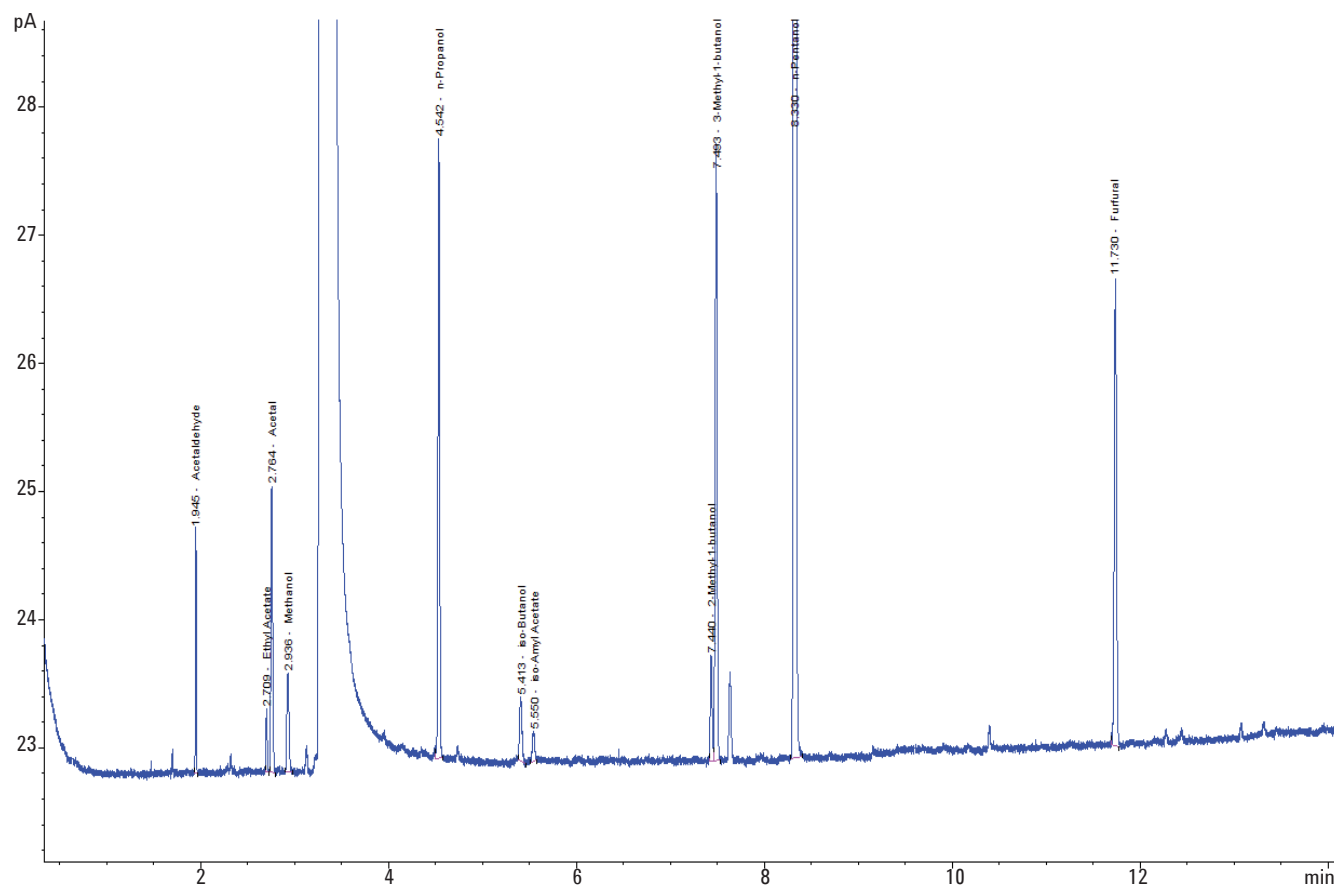


Figure 1. GC analysis of counterfeit Scotch whisky on CP-Wax 57 CB Basic

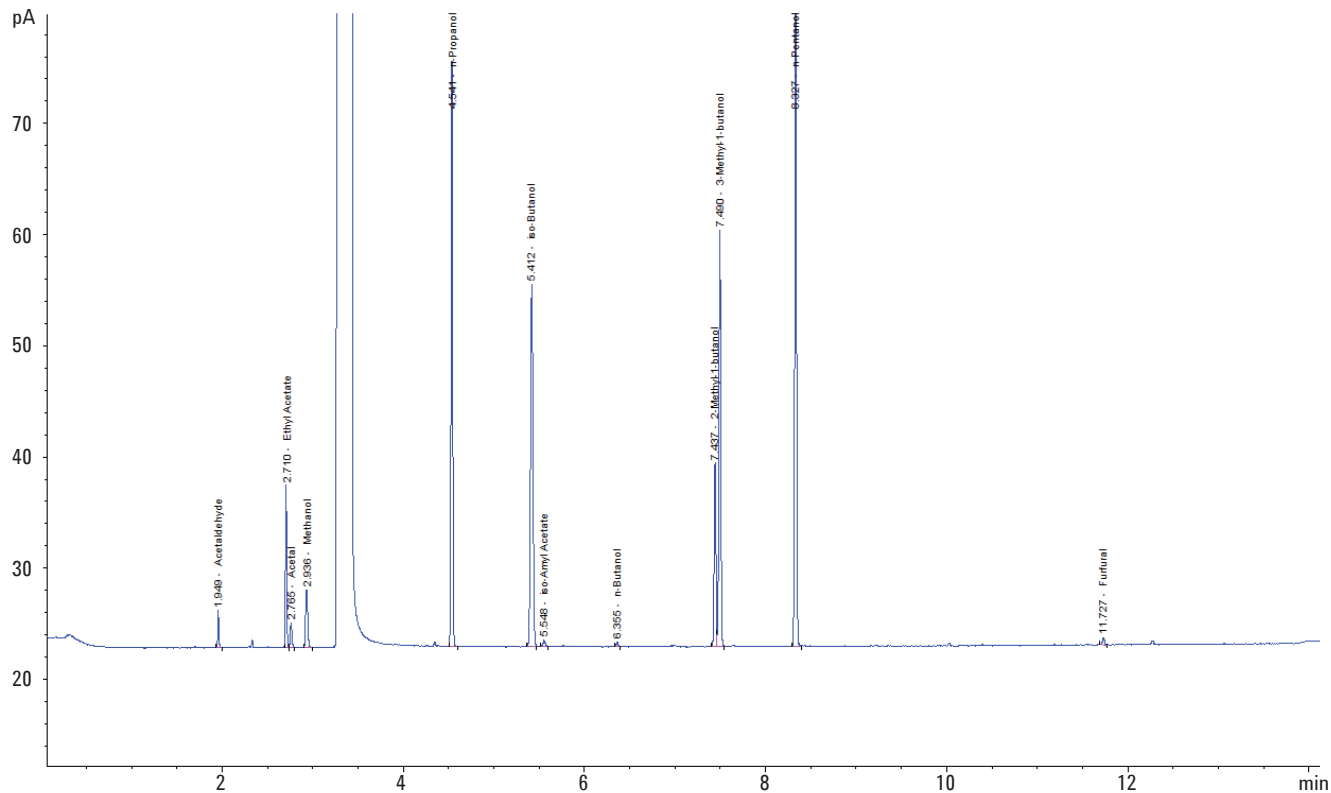


Figure 2. GC analysis of genuine blended Scotch whisky on CP-Wax 57 CB Basic

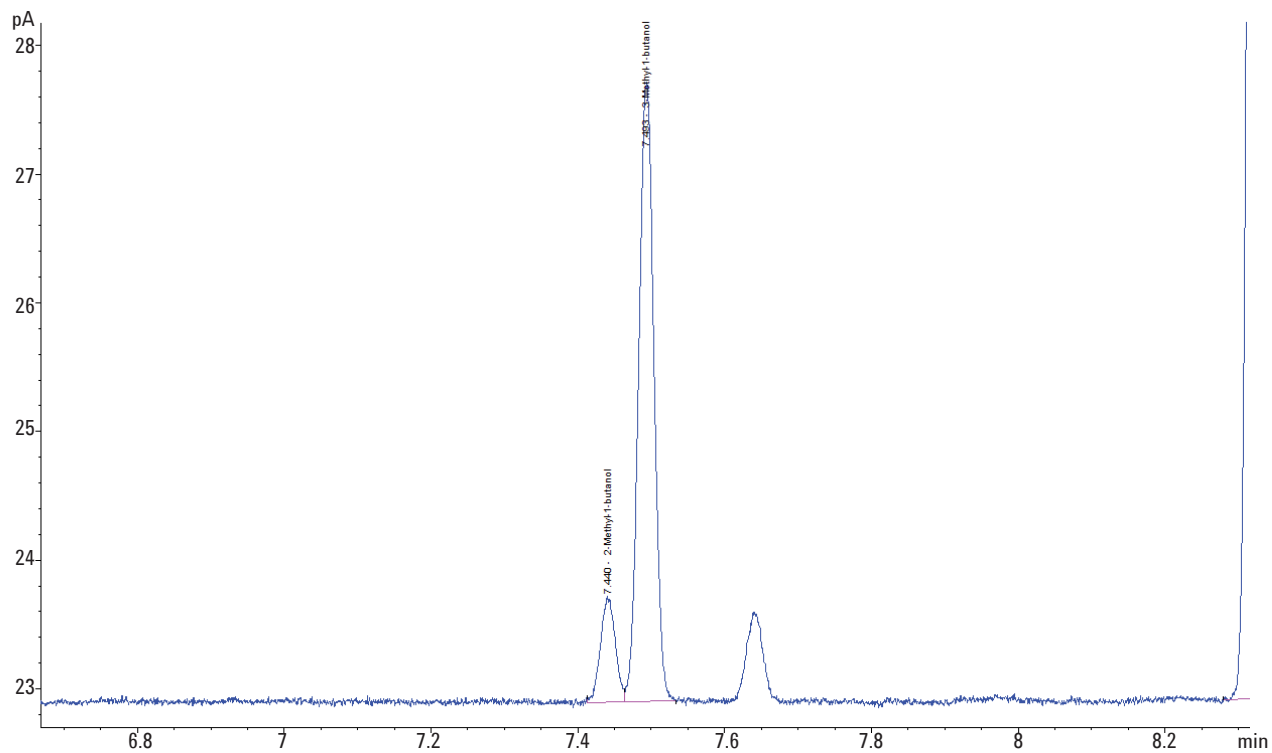


Figure 3. Expanded view of counterfeit Scotch whisky analysis on CP-Wax 57 CB Basic

Conclusions

The authentication of whisky products can be successfully carried out using the CP-Wax 57 CB Basic column because of its excellent separation of important chemical whisky descriptors such as the 2-methyl-1-butanol and 3-methyl-1-butanol. The highly durable CP-Wax 57 CB Basic column will provide a reliable GC analysis of alcoholic spirits for many hundreds of samples.

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